



# JP11064385A2: PROBE FOR SUBSTRATE FOR INSPECTION

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Abstract: **Problem to be solved:** To realize Kelvin connection as the contact resistance measure of a needle member to the connection pad of the semiconductor substrate of an inspecting object without increasing the size of the connection pad.  
**Solution:** This probe is provided with plural needle members projecting at the rear surface of a substrate for inspection and the tip of this needle member is brought into contact with the connection pad 4 of the semiconductor substrate of an inspecting object. These needle members are arranged proximately by two members (2f and 2s) in the state of being Kelvin-connectable to a single connection pad 4 of the semiconductor substrate of the inspecting object and at the time of press contact with the pad 4, the members are elastically deformed to make the tip parts of them mutually approach at a small interval to be in contact with the pad 4. Thereby, Kelvin connection as the contact resistance measure of the needle members to the connection pad 4 of the semiconductor substrate of an inspecting object is realized without increasing the size of the pad 4.  
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Foreign References: (No patents reference this one)



Nominate this  
invention

\* NOTICES \*

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2. \*\*\*\* shows the word which can not be translated.
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DETAILED DESCRIPTION

[Detailed Description of the Invention]  
[0001]

[The technical field to which invention belongs] this invention relates the kelvin connection as a cure against contact resistance of needle material [ as opposed to the connection pad of the semiconductor substrate of especially the above-mentioned subject of examination about the probe of the checking substrate which carries out a property check of a semiconductor substrate to be examined using the checking substrate called probe card to which two or more needle material protruded on the rear face ] to the probe of the checking substrate which can realize the size of this connection pad, without large-sized-izing.

[0002]

[Description of the Prior Art] As shown in drawing 3, the probe of the conventional checking substrate has two or more needle material 2 and 2 and -- which were projected and prepared in the rear face of the checking substrate 1 which consists of a printed-circuit substrate and is called probe card, and it was constituted so that this needle material 2 and 2, the connection pads 4 and 4 of the semiconductor substrates 3, such as a wafer, of -- whose points are subjects of examination, and -- might be contacted. And if the connection pads 4 and 4 and -- which were arranged in the above-mentioned needle material 2 and 2 and the top of the semiconductor substrate 3 which a point should inspect of -- are contacted The electrical signal which flowed by the contact is led to the pins 5 and 5 prepared in the above-mentioned checking substrate 1, and the conductor pattern (not shown) arranged in the upper check box 6 through --. Furthermore, it is sent to a circuit tester 8 through the connector (not shown) and the signal line 7 of the above-mentioned check box 6, and a necessary property check carries out about the chip arranged on the semiconductor substrate 3 by this circuit tester 8.

[0003] If the checking substrate 1 is dropped in drawing 3, or the semiconductor substrate 3 is raised and the point of the needle material 2 contacts the connection pad 4 of the above-mentioned semiconductor substrate 3 in such the status, the press contact of the above-mentioned needle material 2 will be carried out at the connection pad 4, carrying out elastic deformation. When dust etc. had adhered at the nose of cam of this needle material 2 at this time, a property check of the chip by which the contact resistance with the connection pad 4 was arranged on the large next door and the semiconductor substrate 3 was not completed, or it might be incorrect-detected, having used the excellent article as poor.

[0004] Then, as a cure against contact resistance of the needle material 2 to the above-mentioned connection pad 4, as shown in drawing 4 To one connection pad 4, it arranges two needle material 2 in longitudinal direction at a time, it is arranged in it with 2f of the needles by the side of a force (side which impresses a voltage), and 2s of the needles by the side of a sense (side which detects a voltage), and it is [ 2f of these two needles ] made to contact one connection pad 4 certainly in 2s. This is called kelvin connection-ization.

[0005]

[Problem(s) to be Solved by the Invention] However, it sets to the probe of such a conventional checking substrate. In order that a press contact is carried out, and two needles 2f and 2s located in a line with longitudinal direction may rub against this connection pad 4 in the \*\*\*\* area a and a and may connect with the connection pad 4, respectively, as shown in drawing 5, if kelvin connection is formed as shown in drawing 4, it was that to which the size of the connection pad 4 large-sized-izes only spacing b of the contact fraction of two above-mentioned needles 2f and 2s. From this, the area of the chip arranged on the semiconductor substrate 3 increases, and the number of arrays might be limited.

[0006] Then, this invention copes with such a trouble and aims at offering the probe of the checking substrate which can make kelvin connection as a cure against contact resistance of the needle material to the connection pad of a semiconductor substrate to be examined, without large-sized-izing the size of this connection pad.

[0007]

[Means for Solving the Problem] In order to attain the above-mentioned purpose, the probe of the checking substrate by this invention In the probe of the checking substrate constituted so that it might have two or more needle material which protruded on the rear face of a checking substrate and the point of this needle material might contact the electrode pad of semiconductor equipment to be examined While it approaches two at a time and arranging possible [ kelvin connection ] to one connection pad of a semiconductor substrate to be examined, when the above-mentioned connection pad is made to carry out a press contact, elastic deformation of the above-mentioned needle material is carried out, those points approach mutually at a minute spacing, and it is made to contact this connection pad.

[0008] Moreover, two above-mentioned needle material may give an insulated manipulation to the front face of an inside fraction approached mutually.

[0009]

[Embodiments of the Invention] Hereafter, the gestalt of operation of this invention is explained in detail based on an accompanying drawing. Drawing 1 is side face explanatory drawing showing the gestalt of operation of the probe of the checking substrate by this invention, and drawing 2 is the partial expansion explanatory drawing. The probe of this checking substrate is what carries out a property check of semiconductor substrates (for example, wafer etc.) to be examined using the checking substrate called probe card. When shown in drawing 3, it has two or more needle material 2 and 2 and -- which were similarly projected and prepared in the rear face of the checking substrate 1 which consists of a printed-circuit

substrate, and it is constituted so that this needle material 2 and 2, the connection pads 4 and 4 of the semiconductor substrate 3 of a subject of examination [ point ] of --, and -- may be contacted. The quality of the material of the above-mentioned needle material 2 consists of for example, platinum palladium, the beryllium kappa, a tungsten, etc., and the lower part can be formed in the shape of bending, and it can carry out elastic deformation of the configuration while it is formed, for example in the shape of [ thin ] round bar.

[0010] If shown in drawing 3, the check box 6 is similarly attached in the upper part of the above-mentioned checking substrate 1. The conductor layer formed in the pins 5 and 5 which it is, and the screw setting is carried out with the screw 11 in the circumference section of the above-mentioned checking substrate 1, and are called POGO pin, the conductor layer formed in the checking substrate 1 of --, and this check box 6 for this check box 6 connecting electrically the checking substrate 1 and the below-mentioned circuit tester 8 is connected mutually. And the circuit tester 8 is connected to the above-mentioned check box 6 through the signal line 7. This circuit tester 8 actually carries out a necessary property check about the semiconductor substrate 3 to be examined, and is electrically connected to the checking substrate 1 through the conductor pattern (not shown) and connector (not shown) which were arranged in the above-mentioned signal line 7 and the check box 6.

[0011] While it approaches [ as opposed to / one of the connection pad 4 of the semiconductor substrate 3 of a subject of examination / material / needle / 2 / above-mentioned ] / as this invention is shown in the drawing 1 and the drawing 2 here ] two at a time possible / kelvin connection / and it is arranged, when the above-mentioned connection pad 4 is made to carry out a press contact, elastic deformation is carried out, and it approaches mutually / those points / at a minute spacing, and is made to be contacted by this connection pad in addition, with the above-mentioned kelvin connection, as a cure against contact resistance of the needle material 2 to the connection pad 4. To one connection pad 4, it puts two needle material 2 in order at a time, it is arranged with 2f of the needles by the side of a force (side which impresses a voltage), and 2s of the needles by the side of a sense (side which detects a voltage), and it carries out [ 2f of these two needles ] as [ contact / certainly / one connection pad 4 / in 2s ]. And in this invention, it does not arrange in longitudinal direction like before which shows two above-mentioned needles 2f and 2s in the drawing 4 and the drawing 5, but it approaches and arranges so that it may lap in the vertical orientation by plane view.

[0012] Therefore, if the connection pad 4 is made to carry out the press contact of the two needles 2f and 2s of the checking substrate 1 as shown in drawing 2, the needles 2f and 2s of these two books carry out elastic deformation to the method of an outside like arrow head P, and those points will approach mutually at a minute spacing, and will contact this connection pad 4. At this time, the point of two above-mentioned needles 2f and 2s will approach that there is almost no opening, and contacts one connection pad 4 just like one needle material 2. Like one needle material 2, by \*\*\*\* area c, it will rub and will connect with this connection pad 4 from this. In this case, since \*\*\*\* area c of the point of two above-mentioned needles 2f and 2s hardly changes with conventional needles [ which are shown in drawing 5 / each / 2f and 2s ] \*\*\*\* area a, the size of the connection pad 4 does not large-sized-ize it.

[0013] Moreover, as two above-mentioned needles 2f and 2s are shown in drawing 2, the insulated manipulations 9 and 9 are given to the front face of an inside fraction approached mutually. However, an insulated manipulation is not given but the apical surfaces 10 and 10 in contact with the needles [ each / 2f and 2s ] connection pad 4 are made into the flow side. If it does in this way, even if two above-mentioned needles 2f and 2s carry out elastic deformation to the method of an outside like arrow head P and those points contact, it will not flow electrically, kelvin connection will be made correctly, and a property check can be performed.

[0014] When shown in drawing 3, the semiconductor substrate 3 which the checking substrate 1 shown in drawing 1 is dropped, or is shown in drawing 3 is raised, and the electrode pad 4 of the semiconductor substrate 3 to be examined is made to carry out the press contact of the point of every two needle material 2f and 2s which protruded on the rear face of the above-mentioned checking substrate 1 similarly in such the status. At this time, as shown in drawing 2, the point makes kelvin connection of the two needle material 2f and 2s by \*\*\*\* area c at one connection pad 4. Then, the electrical signal which flowed by this contact is led to the pins 5 and 5 prepared in the above-mentioned checking substrate 1, and the conductor pattern (not shown) arranged in the upper check box 6 through --, and is further sent to a circuit tester 8 through the connector (not shown) and the signal line 7 of the above-mentioned check box 6. And a necessary property check is carried out about the chip arranged on the semiconductor substrate 3 by this circuit tester 8.

[0015]

[Effect of the Invention] Since this invention was constituted as mentioned above, while it approaches two at a time and two or more needle material which protruded on the rear face of a checking substrate is arranged possible [ kelvin connection ] to one connection pad of a semiconductor substrate to be examined. By carrying out elastic deformation, and those points' approaching mutually at a minute spacing, and having been made to contact this connection pad, when the above-mentioned connection pad was made to carry out a press contact. The point of two above-mentioned needle material will approach that there is almost no opening, and contacts one connection pad just like one needle material. In this case, since the \*\*\*\* area to which the point of two above-mentioned needle material contacts one connection pad hardly changes with the \*\*\*\* area of each conventional needle material shown in drawing 5, the size of the one above-mentioned connection pad does not large-sized-ize it. Therefore, kelvin connection as a cure against contact resistance of the needle material to the connection pad of the above-mentioned semiconductor substrate to be examined can be made, without large-sized-izing the size of this connection pad. It can \*\*, if the number of arrays is usually made into the thing of a passage, without the area of the chip arranged on a semiconductor substrate increasing from this.

[0016] Moreover, about two above-mentioned needle material, in what gave the insulated manipulation to the front face of an inside fraction approached mutually, as the needle material of these two books shows in drawing 2, even if it carries out elastic deformation to the method of an outside like arrow head P and those points contact, it does not flow electrically, kelvin connection is made correctly, and a property check can be performed.